AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

BPA NO.	1. CONTRACT ID CODE	PAGE	OF PAG
		1	

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
3	SEP 2 8 2004		

6. ISSUED BY	CODE	7. ADMINISTERED BY (If other than Item 6)	CODE
U.S. Nuclear Regulatory Commission Div of Contracts Two White Flint North - MS T-7-I-2 Washington, DC 20555	3100	U.S. Nuclear Regulatory Commission Div of Contracts Two White Flint North - MS T-7-I-2 Washington, DC 20555	3100

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)	(X)	9A. AMENDMENT OF SOLICITATION NO.
ADVANCED SYSTEMS TECHNOLOGY AND MANAGEMENT INC ATTN: Mr. Bing Ran, Executive Vice President 8300 Old Courthouse Road, Suite 210 VIENNA VA 22182		9B. DATED (SEE ITEM 11)
		10A. MODIFICATION OF CONTRACT/ORDER NO. NRC-04-04-072
CODE / FACILITY CODE	X	10B. DATED (SEE ITEM 13) 04-21-2004

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
(a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment of each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
31X0200.460 252A Y6998
46015110205 Obligated Amount: $64,975

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(X)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER (Specify type of modification and authority) 52.243-2 Changes - Cost Reimbursement Alternate I (APR 1984)

E. IMPORTANT: Contractor ☐ is not, ☒ is required to sign this document and return 2 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

(see page 2)

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Bing Ran, Executive Vice President	Mary Mace, Contracting Officer
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED
(Signature of person authorized to sign)	9/28/04
	16B. UNITED STATES OF AMERICA
	BY (Signature of Contracting Officer)
	16C. DATE SIGNED 9/27/04

STANDARD FORM 30 (REV. 10-83)

TEMPLATE - ADM001

ADM002

This modification is issued to (1) revise the subject contract in accordance with the attached Statement of Work (see highlighted sections of ATTACHMENT 1) and incorporate the contractor's revised proposal dated 9/24/04, (2) increase the contract ceiling by $64,975 from $199,977.10 to $264,952.10, (3) increase the obligated amount by $64,975 from $199,977.10 to $264,952.10, and (4) extend the period of performance under the contract through March 31, 2005. Accordingly, the contract is hereby modified as follows:

(1) Section B.3, Consideration and Obligation-Cost Plus Fixed Fee (JUN 1988), Alternate I (JUN1991), paragraphs (a), (c), and (d) are deleted in their entirety and the following paragraphs are substituted in lieu thereof:

"a. The total estimated cost to the Government for full performance of this contract is $264,952.10, of which the sum of $244,344.31 represents the estimated reimbursable costs, and of which $20,607.79 represents the fixed fee."

"c. The amount presently obligated by the Government with respect to this contract is $264,952.10, of which the sum of $244,344.31 represents the estimated reimbursable costs, and of which $20,607.79 represents the fixed fee.

d. It is estimated that the amount currently allotted will cover performance through 11 months."

(2) Section F.5, Duration of Contract Period (MAR 1987), the paragraph is deleted in its entirety and the following paragraph is substituted in lieu thereof:

"This contract shall commence on April 21, 2004 and will expire on March 31, 2005."

A summary of obligations for this contract, from date of award through the date of this action, is given below:

Total FY2004 Obligations:	$264,952.10
Cumulative Total of NRC Obligations:	$264,952.10

This modification obligates $64,975 in FY2004 funds.

All other terms and conditions remain the same.

TRACE Developmental Assessment - ROSA-IV Tests
Statement of Work (SOW)

A. BACKGROUND

The TRACE code is being developed by the NRC to perform large and small break loss-of-coolant accident and system transient analysis for wide range of nuclear plants. This code will be used as an audit tool to support reviews of transient and accident analyses submitted by the vendors for licensing of nuclear reactors. The predictions of the TRACE code need to be assessed by comparing simulation results to experimental data. These comparisons help to quantify the conservatism of licensing calculations and ability of TRACE to model and simulate various thermal-hydraulic events.

B. OBJECTIVE

The objective of this work is to perform a part of the developmental assessment of thermal-hydraulic capabilities of the TRACE code to calculate small break loss-of-coolant accident (SBLOCA) phenomena simulated in the ROSA-IV test facility and to quantify margins between code predictions and experimental data.

C. SCOPE OF WORK

General Requirements for Development Assessment

Developmental assessment (also known as validation testing) is a part of code quality assurance procedures outlined in "Software Quality Assurance Procedures for NRC Thermal Hydraulic Codes", NUREG-1737. In the developmental assessment process, code-calculated results are compared either to analytical results, or experimental results, or other acceptable code calculation. In this SOW, TRACE code calculations are compared to experimental data from the ROSA-IV test facility and a report describing the results of the developmental assessment is produced. Developmental assessment shall contain the following activities:

1. Identification of the phenomena occurring in the test facility. This requires careful study of the test facility, experimental procedure, and experimental data. The report shall include a description of the facility, experimental procedure, and discussion of the measurement uncertainty, interpretation of the data, and the effect of the uncertainty on the data and their interpretation.
2. Development of the input deck. This requires familiarity with the TRACE User Guide and an understanding of the phenomena (see item above) in order to capture important phenomena governing the process. The report shall include nodalization diagrams, as needed, a listing of the input deck, and discussion and justification of options used to construct the input deck.
3. Development of the acceptance criteria. Acceptance criteria permit acceptance of results calculated by the code when compared to experimental data. It requires careful study of the experimental data to distinguish measurement uncertainty from random behavior of the data, especially during two-phase flow. As explained in NUREG-1737, the acceptance criteria can be qualitative or quantitative. Appendix C of NUREG-1737 presents a sample acceptance criteria. The report shall include a discussion of the development of the acceptance criteria used for this project.

4. Comparison of Code Calculations with the Test Data. This requires running the code with a selected version of the code and comparing the results with test data. If comparisons indicate that the acceptance criteria are met, then the code results are acceptable. If they do not meet the acceptance criteria, sensitivity calculations may be required. Sensitivity calculations may be needed in order to capture phenomena more accurately. These calculations are performed using different nodalization schemes or choosing more appropriate options. Changes to the input deck to perform sensitivity calculations should be discussed and justified. If sensitivity calculations indicate a better agreement with the test data and that acceptance criteria are met, new user guidelines better capturing the phenomena should be prepared. The report shall include discussions of comparisons of code calculations with the test data, including whether or not acceptance criteria are met. If the criteria are not met, the report shall also include discussion of the need for sensitivity calculations, and if sensitivity calculations are performed, the report shall also include a description of the calculated results and new user guidelines, if applicable.
5. Identification of Code Deficiencies. This requires knowledge of the TRACE code, itself. If the comparison of the results are poor (i.e. results do not meet the acceptance criteria) and sensitivity calculations cannot improve predictions, then there may be a bug in the code or deficiencies in the code physical models, themselves. The report shall identify potential deficiencies to the extent possible and make recommendations for code improvements.

Task 1: TRACE Development and Assessment

This task encompasses both TRACE development and assessment technical service to be provided by the contractor under the existing contract. The subtasks within Task 1 are described as follows.

1.1 TRACE Assessment Using Additional ROSA IV Small Break Experiments

Obtain information on the ROSA-IV (Rig of Safety Assessment) test facility and experimental data related to runs SB-CL-01, SB-CL-14, SB-CL-15, SB-CL-16, and SB-CL-18. Using the general guidelines above:

A) Using the input deck for ROSA-IV test run SB-CL-05, develop a TRACE input deck suitable for simulation of ROSA-IV small break loss-of-coolant accident tests SB-CL-01, SB-CL-14, SB-CL-15, SB-CL-16, and SB-CL-18.

B) Simulate ROSA-IV tests SB-CL-01, SB-CL-14, SB-CL-15, SB-CL-16, and SB-CL-18 which is a small break loss-of-coolant accident test. Compare the code predicted results to the applicable experimental data. The contractor shall develop AVScript inputs for each test run so that the same test condition can be simulated easily with newer versions of the TRACE code

C) perform nodalization studies to ensure that each model achieves a properly converged result as the noding sizes are decreased

D) Using the general guidelines above, produce a combined technical report that documents the results of test runs SB-CL-01, SB-CL-05, SB-CL-14, SB-CL-15, SB-CL-16, and SB-CL-18 (i.e., producing a consolidated TRACE assessment report based on ROSA tests). The report should 1) contain short descriptions of the relevant parameters of the ROSA-IV test facility and

all the test runs, 2) describe the phenomena occurring in each individual test run, 3) discuss why the input deck with selected nodalization and options should capture the phenomena, 4) discuss comparisons of the TRACE calculations with the test data, 5) provide details of the TRACE calculations and discuss the acceptability of these calculations, and 6) identify any code related problems and new user guidelines, if applicable, 7) include an appendix with the calculation notebook in electronic format, 8) describe the quality of the test documentation and data acquisition adequacy, and 9) list and describe the principal and subsidiary figures of merit. If the code does not run or some errors are discovered, these problems shall be communicated to the NRC. The NRC staff will resolve these problems within a period of time which will be negotiated. If the correction of these errors cause some delays in delivery of final products, the NRC project manager will initiate appropriate modifications as necessary. The report will be prepared first in a draft form for review by NRC. It will be issued in a final form after the contractor resolves the comments. This combined report should be compiled and delivered in Framemaker format and use templates provided by NRC sufficient for insertion into the TRACE Development Assessment Manual. The contractor is permitted to purchase 3 copies of Framemaker 7.0 (or newer) for purposes of this project.

Estimated Completion Date: March 2005

Task 2: Project Management

The contractor will provide planning, administration, and management of this project at its premises. The contractor will review all deliverables for technical accuracy and quality. The contractor will provide status reporting as needed by NRC. The contractor will prepare for and attend meetings such as Advisory Committee for Reactor Safety (ACRS) meetings, Nuclear Safety Research Conference (NSRC), and review meetings as requested by NRC.

Estimated Completion Date: March 2005

D. REPORTING REQUIREMENTS

Monthly Letter Status Reports

A monthly letter status report (MLSR) must be submitted to NRC by the 20th of each month. The MLSR shall be delivered to the NRC project manager and the Division of Contracts and Property Management, Office of Administration. These MLSR's must include: the full name and address of the contractor, contract number, and the title of the project; the principal investigator's name and telephone number; the project period of performance; and the reporting period. The MLSR must include the following sections:

1. **Objective** - Provide a brief statement of understanding of the objectives of the project
2. **Spending Plan** - Provide a list of expenditures on each task for the period and compare results with the funding allocated and remaining for the task
3. **Progress During Reporting Period** - Discuss the work performed during the reporting period. Discussion must include sufficient detail to support the costs reported for the period.
4. **Financial Schedule Status** - Report costs incurred during the reporting period in the attached format and discuss reasons for deviation from the spending plan, if any.

Discuss the status of the projected cost and schedule of the project. Update the spending plan if the cumulative variance is more than 20%.

5. **Travel** - Travel taken during the reporting period must be described and must include, as a minimum, the purpose of the travel, whether prior NRC authorization was required and obtained, the identity of the traveler, beginning and end days of the travel, and the origin and destination points. The cost of travel shall be reported in "Financial Schedule Status" as per the attached format.
6. **Anticipated and Encountered Problem Areas** - Problems both encountered during the performance period and anticipated for the next performance period must be identified and discussed. Discussion of problems must include the actual or proposed solutions if a solution has not been implemented during the performance period.
7. **Variance** - Any variance in either schedule or spending rate must be identified and discussed in detail. Discussions must include the cause for the variance, together with any proposed solution to the dates and cost within planned dates and amounts.

E. DELIVERABLES AND DELIVERY SCHEDULE

1.	Combined Draft Report on Assessment of TRACE against 6 ROSA-IV Tests	02/05
2.	Combined Final Report on Assessment of TRACE against 6 ROSA-IV Tests	03/05
3.	Electronic copies of all input decks and AVScript input files	03/05
4.	Calculation notebooks for all unique input decks prepared	03/05

The contractor shall review technical reports to ensure they are of high quality. The format of technical reports should follow generally accepted technical writing practices (see NUREG-650, Revision 2, "Publishing Documents in the NUREG Series"). The author must consider the audience who will read the document; link ideas in sentences and paragraphs to create an easy-to-follow logical transition; and ensure consistency of terminology, format, and style throughout. The reports should be well-focused (i.e. they should not be too wordy and the prose should flow in a logical manner). The author must provide necessary information to avoid prose where logic would be incomplete. Technical reports should not include policy, administrative, managerial, or fiscal information unsuitable for wide dissemination. They should not contain proposals for additional work and words should be carefully selected to avoid marketing of contractor capabilities.

F. MEETINGS AND TRAVEL REQUIREMENTS

The contractor will plan on attending meetings at the NRC office in Rockville, Maryland. For planning purposes, the contractor may attend one domestic technical society meeting and present a paper. Any domestic travel must be approved in advance by the NRC Project Manager.

G. PERIOD OF PERFORMANCE

Period of performance is 11 months

H. TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED

The performance of this work scope requires knowledge of thermal-hydraulics. Personnel working on this project should have an engineering degree or equivalent and should have knowledge or experience in the field of thermal-hydraulics.

I. TECHNICAL DIRECTION

The NRC project manager, Mr. Christopher Murray, is responsible for ensuring that services required under this project are delivered in accordance with the terms of the SOW. All technical direction instructions to the contractor shall be issued through the PM. Technical direction includes interpreting technical specifications, providing needed details, and suggesting possible lines of inquiry. Technical direction shall not constitute new work or affect overall project cost or period of performance. Technical direction will be provided in writing, confirmed in writing by the contractor with a copy placed in the NRC office project file.

J. PUBLICATIONS

RES encourages the publication of scientific results from RES-sponsored programs in refereed scientific and engineering journals, as appropriate. If the contractor proposes to publish in the open literature or present the information at meetings in addition to submitting the required technical reports, approval of the proposed article or presentation should be obtained from the NRC project manager (PM). The RES PM shall either approve the material as submitted, approve it subject to NRC suggested revisions, or disapprove it. In any event, the RES PM may disapprove or delay presentation or publication of papers on information that is subject to Commission approval that has not been ruled upon or which has been disapproved. (Additional information regarding the publication of NRC-sponsored research is contained in NRC Management Directive 3.8 and 3.9).

If the presentation or paper is in addition to the required technical reports and the RES PM determines that it will benefit the RES project, the PM may authorize payment of travel and publishing costs, if any, from the project funds. If the PM determines that the article or presentation would not benefit the RES project, the PM can specify that the costs associated with the preparation, presentation, or publication will be borne by the contractor. For any publications falling into this category, the NRC reserves the right to require that such presentation or publication not identify the NRC's sponsorship of the work.

K. NRC-FURNISHED MATERIALS

1. Reports on ROSA-IV Test facility for the following runs - SB-CL-01, 14, 15, 16, 18)
2. Available TRAC-P, TRAC-M, and RELAP ROSA-IV input decks for the tests listed in item 1 above
3. Available experimental data from NRC databank for ROSA-IV tests listed in item 1 above
4. AVScript training, if necessary
5. Framemaker DA report template